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ABSTRACT

The high prevalence of alcohol and substance abuse by adolescents poses a significant threat to the wellness of youth. Adolescents appear to use drugs for a variety of reasons. In addition to the multiple etiologic and risk factors present for substance abuse, there are many pathways teenagers may follow on their way to substance abuse. The prevention strategies which appear to be most effective utilize a social influence approach or emphasize personal and social skills teaching. Prevention programs which promote resisting social influences help adolescents identify and resist specific social pressures to adopt behaviors by informing them about health and social consequences; identifying peer, media, and environmental influences; modeling responses to these influences; role playing; and goal setting. There may be a prophylactic effect to minimal exposure to substance abuse risk factors that may inoculate an adolescent against using drugs. If drug-using behavior is not learned during adolescence due to infrequent exposure to risk, there may be a good chance that drugs will never be used. Many of the program evaluations and research studies conducted so far have some methodological shortcomings. Future studies need to standardize the definition of drug use, include appropriate control groups, and correct for the confounding effects of variables associated with drug use attitudes, behaviors, and risk factors. (ABL)

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# Adolescent Substance Abuse

## Risk Factors and Prevention Strategies

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## Introduction

The high prevalence of alcohol and substance abuse by adolescents poses a significant threat to the wellness of youth.[1] Evidence of frequent drug-related tragedies, including shootings in schools, gang warfare, and drug-related deaths, is widespread. Adolescents are among those at greatest risk for the use of illicit drugs and its associated adverse sequelae. Alcohol and other drugs frequently are implicated in the causes of accidents, homicides, and suicides involving adolescents and cause significant medical, psychological, and social morbidity.

The use of illicit substances by adolescents has blossomed over the last few decades, reaching a peak in 1982 when 65 percent of high school seniors had tried illicit drugs. Prevalence rates for illicit drug use within the previous 30 days peaked in 1979 at 39 percent.[2-4] While adolescent use of illicit drugs has declined in recent years, overall levels remain high compared to use prior to 1965 and are among the highest for industrialized nations. Further, large scale epidemiologic surveys understate the extent of the problem because they do not include drug use among adolescents who have dropped out of school and who therefore are at increased risk for drug abuse. Alcohol and drugs continue to have a great impact on adolescent health.

This bulletin will briefly review recent information concerning the prevalence of adolescent alcohol and drug abuse and related health problems. Associated psychological and behavioral issues, risk factors, and prevention strategies will be discussed in detail.

## Prevalence of Substance Use

Recent data from the 1989 Monitoring the Future survey shows continuation of declines which began in the early 1980s among the percentages of high school seniors using illicit drugs. Still, over half (50.9 percent) of 1989 high school seniors had tried an illicit drug. Annual use of illicit drugs by high school seniors declined from 38.5 percent in 1988 to 35.4 percent in 1989. Current use, defined as use in the last 30 days, declined from 21.3 percent in 1988 to 19.7 percent in 1989. Prevalence rates for marijuana, cocaine, stimulant, and sedative use all continue to decline. Daily marijuana use, which peaked at 10.7 percent in 1978, declined to 2.9 percent in 1989. Even so, 43.7 percent of 1989 high school seniors have tried marijuana, and 31.4 percent have tried illicit drugs other than marijuana, with cocaine, amphetamines, and inhalants the most commonly used. Lifetime use of cocaine by high school seniors, which has declined slowly for three years, decreased from 12.1 percent in 1988 to 10.3 percent in 1989; annual use from 3.4 percent to 2.8 percent. Unfortunately, lifetime, annual, and current use of crack have remained unchanged. Almost 4 percent of high school seniors have used phencyclidine hydrochloride (PCP) at least once; 2.4 percent used it in the past year and 1.4 percent in the past month, reflecting increases over 1988.[4] While there have been encouraging declines, adolescents continue to be significantly involved in illicit drug use.

Despite these declines in illicit drug use, there has been no change in alcohol and cigarette use.[4] In 1989, 91 percent of high school seniors reported having had a drink. There appears to be no decrease in the daily use of alcohol and only a modest decline in binge drinking by high school seniors. Two-thirds (60 percent) have used alcohol in the past month and 33 percent have had five or more drinks in a row on at least one occasion in the past two weeks.[4] In a 1982 school-based survey of drug use, 11 percent of eighth grade students reported frequent consumption of alcohol, averaging the equivalent of 5.6 ounces of alcohol per week. The average self-reported alcohol intake of 12th grade students was two six-packs of beer per week, often consumed at one or two parties.[5] Sixty-six percent of high school seniors in 1989 had tried cigarettes, 28 percent smoked in the past month, 18 percent smoked daily, and 11.2 percent smoked more than half a pack per day.[4] Patterns such as these reflect a significant ongoing problem with alcohol and tobacco use.

For most drugs of abuse, the age of initiation reaches a peak between 16 to 18 years of age, plateaus, and declines after 22 years of age.[5-9] Retrospective data on age of initiation from the annual high school senior surveys show that approximately 10 percent of seniors started alcohol use in the sixth grade, while more than 50 percent had used alcohol by the ninth grade.[9] Many adolescents have their first drink by the age of 13 years.[2] Almost half of those who smoked

cigarettes daily as seniors had started by eighth grade. In 1985, more than 10 percent of high school seniors reporting use of marijuana had first used it in 8th grade, 25 percent tried it by 9th grade, and 40 percent first used it by 10th grade.[9]

Adolescent alcohol and drug use is associated with many of the common morbidities affecting adolescents.[1,10-16] Motor vehicle injuries involving adolescents who have been drinking are a leading cause of death among adolescents, accounting for approximately 20 percent of all teenage deaths.[10] Approximately 25 percent of fatally injured teenage drivers were legally intoxicated at the time of the crash.[11] Twenty-four percent of adolescents in a recent study of drinking patterns and social consequences reported that a good friend had received a citation for driving while intoxicated.[12] Failure to wear seat belts has been associated with higher use of alcohol, cigarettes, marijuana, and cocaine.[13] Substance use has been identified as a significant risk factor for suicides and suicide attempts in adolescence. Thoughts of suicide and actual attempts increase significantly after the initiation of substance use.[14]

Adolescent sexual activity and inadequate use of contraception are also related to substance use. Teenagers who initiate use of one or more substances at an early age are more likely to become sexually active within the following year than those who do not use substances. Conversely, those who engage in sexual activity at a given age are more likely to use alcohol and marijuana during the following year than those who have not had intercourse.[15] Alcohol and drug use may reduce the likelihood that adolescents will use condoms. A recent study showed that teenagers who averaged five or more drinks daily or used marijuana in the last month are significantly less likely to use condoms. In addition, 16 percent of adolescents who said they had sex after drinking reported using condoms less often after drinking than when not drinking, and 25 percent who said they had sex after drug use reported using condoms less often after using drugs.[16]

Despite extensive research on trends in drug usage by adolescents, there is little research that helps clarify the differences between use and abuse.[17] There is almost universal agreement that no single cause or specific reason accounts for all types of drug use or applies to all types of drug abusers.[18] In addition, although much of the research on drug treatment is derived from adult alcohol treatment programs, most of adolescent drug-related problems stem from multiple drug use.[19]

### Psychological and Behavioral Issues

A significant amount of research has been done on psychological issues related to adolescent substance abuse. Many theories have been evaluated including problem behavior, social learning, differential association, control, and strain theories. Each contributes to the overall understanding of adolescent substance abuse. Adolescent problem drinking, cigarette and marijuana use appear to be part of a syndrome of problem behavior—including school dropout, delinquency, alcohol and drug use, and precocious sexual activity—rather than specific isolated problems.[20] Substance use may be part of a general adaptation to self, others, and environment. Problem drug use is a symptom, not a cause, of personal and social maladjustment.[21] It is also important to understand the origins of adolescents' knowledge of the role of substance use and their expectations of its effects and consequences.

Past and current exposure to drinking provides information to children and adolescents which they use to create beliefs and knowledge about drinking. In studying the development of children's beliefs and knowledge about alcohol, age-related differences were found both in children's understanding of adults' drinking motives and in their understanding of the roles and constraints associated with drinking.[22] By the eighth grade, about 75 percent of students believe that alcohol can contribute to desired changes in affect. Observations of children's understanding of the purpose of drinking reveal that younger girls are more likely to attribute psychological reasons for drinking than younger boys.[22] Adolescent females who subsequently develop a drinking problem tend to be anxious, depressed, vulnerable, pessimistic, and submissive.[23] In contrast, adolescent males who later develop a drinking problem are described as outgoing, sociable, dominant, and relatively free of symptoms of depression or anxiety.[24] Girls may be developmentally advanced in recognizing the impact of drinking upon their affect and life experience, which suggests that these girls believe early on in the misconception of drinking relieving troubling feelings.[22]

Studies indicate that the expectancies about the effects of alcohol are more important determinants of social and psychological reactions than is alcohol's pharmacological effects.[25] Individuals drink to alter their present condition and make it congruent with a desired condition.[26] Adolescents have well-established expectations associated with alcohol use, including: reduction of physical tension, diversion from worry, increased interpersonal power, transformation of experiences, enhanced pleasure, and modification of social-emotional behavior.[27] These expectations appear to exist prior to the adolescent's first exposure to drinking. Young adolescents (12 to 14 years of age) and low frequency alcohol users have similar expectations as do older adolescents and heavier drinkers. However, drinking age and drinking frequency do appear to solidify these expectations.[27] It is not clear whether a particular pattern of expectations has significance for the subsequent development of problem drinking. Biddle et al. found that for alcohol, individual enjoyment of drinking was the most powerful predictor of drinking behavior.[28] These results suggest that prevention efforts need to begin in childhood and early adolescence.

Psychological differences between frequent drug users, experimenters, and abstainers can be traced to early childhood. The meaning of drug use can best be understood in the context of an individual's personality and developmental history.[21] In the case of experimenters, drug use may reflect age-appropriate and developmentally understandable experimentation. In the case of frequent users, drug use appears to be a manifestation of a more general pattern of maladjustment that appears to predate adolescence and initiation of drug use.[21]

Problem-behavior theory[20] provides an understanding of many of the psychosocial factors related to substance abuse. Problem behaviors are defined by their deviation from acceptable societal norms and their likeliness to elicit negative responses. Problem-behavior theory suggests that a tendency to problem behavior can be accounted for by the interaction of demographic, psychological, social, environmental, and behavioral variables. Psychological variables include attitudes, values, beliefs, knowledge, and expectations. Social environmental variables represent the influences of peers and adults. Behavioral variables represent the degree of involvement in other problem behaviors and socially approved behaviors. The problem-behavior model has been applied to problem drinking,[29] cigarette use,[30,31] and marijuana use.[32]

As part of the problem-behavior theory, Jessor found a pattern of characteristics which differentiated the problem from the non-problem drinker.[29] These characteristics included greater value on independence, less value on academic achievement, lower academic expectations, more tolerance of transgression, less religiosity, greater importance of the positive functions of drinking, less conventionality and conformity and more emphasis on personal autonomy. In addition, problem drinkers had less compatibility between their parents' and friends' expectations and acknowledged greater influence from friends than from parents. Problem drinkers also were less involved in church, school, or community activities. Perceived environmental factors appear to be more predictive of problem drinking than personality or behavioral factors.[29] Jessor found a nearly identical pattern of psychosocial correlates when applying the problem-behavior model to adolescent marijuana use.[32]

A recent study comparing three deviance-behavior theories strongly supported aspects of differential association theory.[33] Differential association theory postulates that deviance arises when the values of membership in one group, such as a peer group, conflict with the values of more powerful groups of authority, such as family or schools. The best predictors of adolescents' substance use are the proportion of friends who are users and their friends' tolerance of use.[20,33,34] Adolescent alcohol and drug use appears to conform to the behavioral and value structure of the peer group. The learning processes involved in substance use have little to do with the family context. In addition, adolescents with weak ties to conventional social support groups, such as families, schools, and churches, are only slightly more likely than those with stronger ties to engage in substance use. These findings are not influenced by gender or age of the adolescents.[33]

The effect of parents' influence and role modeling on adolescent substance use remains important, and has been emphasized by other studies.[28,35,36] Kandel found that adolescents' susceptibility to various sources of interper-

sonal influence varies at different stages of drug involvement and that the processes through which the influence is exerted vary for different drugs and at different phases of involvement in a particular drug.[35] Parents' influence is strongest in the early stages of drug involvement, preceding initiation. When adolescents are still nonusers they are most susceptible to parental influence. The clearest example is the impact of parental alcohol use and attitudes on adolescent initiation into alcohol. Once drugs have been experimented with, parental influence is mostly indirect through choice of friends. Peer influence dominates after drug use has begun. It is noteworthy that for neither alcohol nor marijuana can parents influence their adolescent's attitude toward the harmfulness of the drug.[35] Parental influence is exerted by establishing norms, whereas peer influence is more a function of modeling drug-using behaviors.[28]

Parenting style also appears to influence the extent to which adolescents use drugs. A recent study showed that adolescents least likely to use alcohol or other drugs typically have an emotionally close relationship with their fathers, receive advice and guidance from their mothers, and are expected to comply with conduct rules.[36] Compared to users, nonusers feel closer to both parents, consider it important to get along well with them, and want to be like them. Nonuser's parents more typically provide praise and encouragement, develop feelings of interpersonal trust, and help with personal problems. Fathers of nonusers are more actively involved in family matters.[36] Prior direct observations of mother-child interactions when current adolescent drug users were five years of age showed that these mothers were perceived to be cold, critical, pressuring, and unresponsive to their children's needs.[21]

Family instability has been associated with higher rates of substance abuse, supporting the concept of self-medication and learned helplessness as dysfunctional coping mechanisms of youth under stress.[37] A disrupted family system is a significant antecedent of both an affiliation with cigarette smoking peers and cigarette smoking itself among adolescents. The risk of cigarette smoking may increase further if the adolescent has little anxiety and develops a nonconformist orientation toward rules and established social roles.[38]

Kandel has proposed that there is a developmental process in which adolescents become initiated into substance abuse through a sequence of stages progressing from legal to illegal and less to more serious drugs.[6,39] The stages begin with: 1) No use of drugs; 2) use of beer or wine; and 3) use of cigarettes or hard liquor. At this point, the use of illegal drugs begins with: 4) marijuana; and 5) other illicit drugs. Drugs begun in earlier stages are carried over to the next stage. This progression appears to be consistent, regardless of gender, ethnicity, size of community, or region of the country.[40] Newcomb confirmed that cigarettes play a prominent role as a gateway to marijuana and hard drugs.[41]

Both current and former marijuana use strongly influences the initiation of other illicit drugs.[8] The initiation of prescribed psychoactive drugs is the most difficult to predict, although it is affected by current or former use of illicit drugs. Adolescent depressive symptomatology is an additional factor in the initiation of prescribed drugs.[8] Depressed marijuana users are more likely than non-depressed users to initiate the use of other illicit drugs. Furthermore, the depression seems to abate over several months with continued use of illicit drugs, suggesting that they serve a self-medicating role.[42]

### Risk Factors for Substance Abuse

Recently, there have been many studies that have explored personality, demographic, psychological, familial, and environmental characteristics associated with adolescent drug use. Adolescent males are more likely than females to use substances.[43] Other than gender, the major demographic variable associated with substance use is age of onset, with an early age of onset being the best predictor of subsequent abuse.[43] While it is clear that early initiation into alcohol and drug use is associated with greater risk of abuse and addiction, the etiology of the relationship is unclear. The prevention of early first use remains an important objective. Factors such as geography, ethnicity, and socioeconomic status are weak predictors of drug abuse.

Numerous factors have been implicated in the initiation and maintenance of adolescent drug use including parent drug use,[44,45] perceived adult drug use,[46,47] peer use,[48,49] poor grades in school,[50] poor relationships with parents,[51] low self-esteem, depression and psychological dis-

tress,[52] unconventionality and tolerance of deviance,[20] sensation seeking,[53] low sense of social responsibility,[54] lack of religious commitment,[55] lack of purpose in life,[56] and early use of alcohol.[57] The multitude of factors associated with adolescent drug involvement suggests that there are probably many diverse paths to drug use that are not captured by a single etiologic cause. This has led to a risk factor approach to understanding teenage drug use.[58] The application of risk factors to drug use hypothesizes that with increased exposure to those factors or influences known to promote drug use, there is an increased chance of drug use or abuse occurring. There are multiple pathways to drug abuse and the number of factors an individual must cope with is more important than exactly what those factors are. For example, there is evidence that drug abusers suffer from anxiety, depression, and poor self-concept more than does the normal population, but no evidence that as a group drug abusers suffer from them in a consistent manner.[59]

Bry et al. developed six risk factors that they demonstrated were quite useful in understanding levels of general drug use. In fact, increasing numbers of risk factors were increasingly related to higher levels of substance use.[60] Newcomb et al. expanded the number of possible risk factors to 10, thus giving additional predictive power, and were able to verify that their composite risk-factor score was predictive of increased drug use over time. They also showed that risk factors were able to explain various types of drug use including cigarettes, alcohol, marijuana, and hard drugs.[18] The ten factors they identified are shown in Table 1.

There is a linear association between the number of risk factors and increased percentage of drug use, frequency of drug use and drug abuse.[18] A larger, more recent study found similar results.[61] It is possible that some risk factors actually are the result of drug use.

Risk factor indexes most strongly relate to alcohol and marijuana use, and least strongly to cocaine use.[61] It is possible that risk factors are most closely related to beginning drug use, and that later harder drug use is influenced by other factors. Exposure to risk factors is not influenced by gender, increases with age, and may be greater for Native American or "other" ethnic groups compared to Asians, blacks, Hispanics, or whites.[62]

**Table 1: Risk Factors for Drug Use Among Adolescents**

Poor Academic Achievement (low grade point average)
Low Religiosity (low religious commitment)
Early Alcohol Use
Poor Self-esteem (low self-acceptance)
Psychopathology (depression)
Poor Relationship with Parents
Deviance (lack of social conformity)
Sensation Seeking
Perceived Peer Drug Use
Perceived Adult Drug Use

*Adapted from:* Newcomb M. D., et al. (1986). Risk factors for drug use among adolescents: Concurrent and longitudinal analyses. *American Journal of Public Health, 76,* 525–531.

In a recent survey of 10th graders, increased levels of substance use by both males and females were most strongly predicted by friends' marijuana use.[62] Interestingly, for males this was followed by perceived safety of cigarette smoking; poor school performance; parents' education; and use of diet pills, laxatives, or diuretics for weight control. For females, friends' use of marijuana was followed by perceived safety of cigarette smoking; use of diet pills, laxatives, or diuretics for weight control; parents' education, perceived adult attitudes about cigarettes; and nonuse of seat belts. Separate analyses for several substances produced similar results, again suggesting that substance use may be considered a single behavior.[62] Consistently, studies show a very strong association between substance use by adolescents and perceived friends' substance use,[8,32,64-67] including samples of out-of-school adolescents.[33,68] There appears to be increased substance use among adolescents reporting purging behaviors.[63]

## Approaches to Prevention

Prevention of adolescent substance abuse requires a broad base of support with community-wide involvement. Prevention is usually defined in public health terms: primary prevention, or preventing drug use before it begins; secondary prevention, or stopping the progression of drug dependency once it begins; and tertiary prevention, or stopping the worst con-

sequences of continuing drug use. Primary prevention may be a school-based educational lecture, whereas secondary prevention may be a parent-peer group that unites parents of teenagers who have drug problems in their efforts to stop the drug use. Many approaches to substance abuse prevention have been previously reviewed.[69-71]

In the late 1960s, the first drug prevention efforts involved the use of the mass media to convey hardline anti-drug messages. By the early 1970s, this had given way to a media campaign that promoted positive values such as love and tolerance, especially in families. In this campaign the dangers of drugs were not emphasized, often drugs were not even mentioned.[71] Later in the 1970s, a lot of effort was given to school-based educational programs that provided balanced and credible drug information. Tobacco, alcohol, and drug education programs were based largely on the assumption that universal knowledge about these substances and the adverse consequences of their use would be an effective deterrent.[73] Evaluation of these programs found that while students knew more facts about drugs, there was no consistent anti-drug effect in attitude and no reduction in actual drug use as a result.[74] In fact, there were concerns that some students who had misconceptions clarified and anxieties relieved by the educational programs may have been more willing to use drugs.[75] The relationship of drug education to subsequent drug use remains unclear.[76]

Another widely applied approach involves "affective" or "humanistic" education. These programs are designed to enhance self-esteem and responsible decision making as well as to enrich the personal and social development of students.[77] The goal is to promote healthy maturation, positive self-esteem, and successful interpersonal skills which hopefully insulate adolescents from drug abuse. The process includes the clarification of values, an analysis of consequences in relation to values, and an identification of alternative behaviors more consistent with one's values.[69]

It appears that neither programs utilizing information dissemination nor those emphasizing affective education are effective in changing actual substance use, despite their ability to convey information.[74,78-80] Contemporary alcohol education programs do address variables that, when considered alone, appear to be related to drinking. These same variables make such a small contribution to drinking behavior, however, that it is unlikely that a successful classroom intervention directed at these variables can prevent alcohol use.[81] In their review of drug abuse prevention research, Schaps et al. concluded that the quality of evaluation of these programs was too inadequate to guide prevention policy and program development.[74]

Another approach focuses on providing adolescents with alternate activities to drug use. Programs may attempt to reduce alienation by involving both youth and adults in significant community projects. Other programs attempt to increase self-esteem by building a sense of accomplishment through skills development or peer leadership training.[69]

Recent research shows promise for school-based programs that teach adolescents peer pressure resistance and social competence skills for avoiding drug use.[81-85] Studies have shown significant (29–67 percent) reductions in experimental smoking rates among adolescents, with more moderate reduction in alcohol and marijuana use.[70] Analysis of 143 drug prevention studies found the inclusion of peers in the teaching process improved program effectiveness.[81] Programs that are initiated in early adolescence (sixth or seventh grade) and that focus on delaying the onset of use of one or more gateway drugs (tobacco, alcohol, and marijuana) are the most effective.[81,84,86-88] Reported effects of large school-based programs, however, have been minimal to moderate and, in some cases, short-lived or delayed.[81,83,87] This may be due to the brevity of most school programs, and the lack of integration of school-based programs with community programs, mass media, and other environmental influences outside the school that conflict with the prevention program.[89,90]

Recent reviews indicate that the most promising substance abuse prevention approaches are those that focus on the psychosocial risk factors promoting substance use initiation.[70,91-93] These approaches focus primarily on either the social influences believed to promote substance use or on approaches designed to enhance personal and social competence by teaching broader coping skills. For example, the social influence

approach to smoking prevention involves: 1) making students aware of the social influences to smoke that they might be exposed to; 2) teaching specific skills, such as refusal skills, with which to resist those influences; and 3) correcting misperceptions of social norms about smoking, such as making students aware that most adolescents do not smoke.[70] Evan's social inoculation theory addresses social influences, beliefs, and attitudes that create pressure on adolescents to use alcohol or drugs.[94] He suggests that students can be effectively inoculated against social influences by gradually exposing them to progressively more intense pro-smoking influences and providing them with specific resistance tactics. In addition to teaching how to say no, these programs also teach alternative responses.

Other strategies have expanded upon inoculation and social learning theories. Features of expanded programs are the use of peer leaders to deliver some or all of the program and the use of role playing and social reinforcement techniques. Evidence supports the use of peer leaders for this type of prevention strategy.[95,98] Some studies include a public commitment by the students to avoid drug use. Varieties of social influence programs have been conducted in northern California,[92,97-99] Minnesota,[95,100-102] Massachusetts,[103,104] Oregon,[105] Michigan,[106] and southern California.[107] Most programs target junior high school students, and they vary in length from three or four sessions to twelve sessions conducted over two years.

Smoking prevention programs utilizing a social influence approach have been very successful. The reported results indicate reductions of 33 percent to 39 percent in the proportion of individuals beginning to smoke, 43 percent to 49 percent reduction in regular smoking, and 29 percent to 67 percent reduction in experimental smoking. It is difficult to determine the extent to which prevention programs have an impact on those most likely to develop more extreme substance use. Using a smoking prevention program, Best found the program to be more effective for students identified as being at high "social risk" for cigarette smoking than for other students in the sample.[108] While the social influence approach has been used primarily with cigarette smoking, programs have demonstrated impact on alcohol and marijuana use[97] and knowledge.[96]

A broader-based substance abuse prevention approach focuses on generic personal and social skills teaching. These approaches are based on social learning theory and problem-behavior theory.[20] Generic personal and social skills training approaches to substance abuse prevention have been tried in New York,[109-113] Tennessee,[84] and Washington.[114-116] These approaches generally include some of the following components: 1) general problem solving and decision-making skills such as brainstorming and systematic decision-making techniques; 2) general cognitive skills for resisting interpersonal or media influences, such as identifying persuasive advertising appeals and formulating counter-arguments; 3) skills for increasing self-control and self-esteem such as self-instruction, self-reinforcement, goal setting, and principles of self-change; 4) adaptive coping strategies for relieving stress and anxiety through cognitive coping skills or behavioral relaxation techniques; 5) general interpersonal skills such as initiating social interactions, complimenting, and conversational skills; and 6) general assertive skills such as making requests, saying no, and expressing feelings and opinions. These skills are taught using a combination of instruction, demonstration, feedback, reinforcement, behavioral rehearsal (practice during class), and extended practice through behavioral "homework" assignments.[70]

Most of the programs have focused on seventh grade students, some on sixth graders. Program length ranges from 7 to 20 sessions, and most use adult providers. These programs have focused primarily on cigarette smoking and have shown reductions in experimental smoking ranging from 42 percent to 75 percent.[70] Botvin reported significant effects for alcohol[112,113] and marijuana use.[112] It is also suggested that a more intensive programming format (several sessions per week) may be more effective than a less intensive format spread over a longer period.[112] Booster sessions may help sustain and even enhance program effects.[111]

In general, the personal and social skills training programs appear to produce greater reductions in substance use than the social influence programs, with the largest effects produced by programs containing components from both. Botvin has reviewed some of the research and methodological issues of the programs.[70] Studies indicate that these prevention strategies can

produce changes on hypothesized mediating variables, providing support for their construct validity.[84,116,117] Any long-term effects from such interventions may be limited and may depend upon the individual program.[81,118,119]

Pentz has suggested that a preventive intervention model that uses multiple environmental influences might be necessary to effect long-term changes in adolescent drug use.[120] These influences could support prevention skills learned in a school-based program and promote a consistent community norm for not using drugs. Pentz et al. have reported the initial effects of a comprehensive, community-based program that uses school, mass media, parent, community organization, and health policy programming to reduce the prevalence of gateway drug use by adolescents.[120] In the first two years of the project, sixth and seventh grade students received school-based education, with parental involvement in homework and mass media coverage. Prevalence rates for cigarette, alcohol, and marijuana use are significantly lower than in comparable schools. The net increase in drug use prevalence is also lower among intervention schools. Recently, a defined population study on predictors of adolescent substance use concluded that the substantial drug use influence represented by the perceived social environment might be most modified through community-based prevention efforts that promote drug use resistance skills and non-drug use social norms.[62] A comprehensive approach utilizing school core teams collaborating with parents and community representatives of law enforcement, social agencies, businesses, religious groups, and the media to develop and maintain drug-free schools and communities has been discussed.[121] Community-wide prevention projects which supplement school-based intervention programs must have high visibility, should involve large numbers of individuals and organizations, be self-perpetuating, involve diverse subpopulations, and be clearly tied to the school-based program.[122]

## Summary

Substance abuse by adolescents continues to be a major public health problem. Adolescents appear to use drugs for a variety of reasons. In addition to the multiple etiologic and risk factors present for substance abuse, there are many pathways teenagers may follow on their way to substance abuse. Adolescent substance abuse can be viewed as one syndrome which is not specific to individual drugs and may be part of a larger problem behavior syndrome. An effective prevention model should identify and address known risk factors, target high-risk populations, be developmentally and ethnically appropriate, and involve multiple integrated components which address risk factors across cultural, environmental, community, family, and individual domains.

The prevention strategies which appear to be most effective utilize a social influence approach or emphasize personal and social skills teaching. Prevention programs which promote resisting social influences help adolescents identify and resist specific social pressures to adopt behaviors by informing them about health and social consequences; identifying peer, media, and environmental influences; modeling responses to these influences; role playing; and goal setting. Other programs involve teaching generic personal skills such as problem-solving and decision making, cognitive and behavioral coping strategies for relieving stress, and teaching social skills to improve communication and assertiveness. In general, the personal and social skills training programs appear to produce greater reductions in substance use than the social influence programs, with the largest effects produced by programs combining features of both. In addition, programs should extend beyond the schools to community-wide involvement to help reinforce messages and influence social norms. Prevention efforts should involve educators, parents, community leaders, and law enforcement agencies.

There may be a prophylactic effect to minimal exposure to substance abuse risk factors that may inoculate an adolescent against using drugs. If drug-using behavior is not learned during adolescence due to infrequent exposure to risk, there may be a good chance that drugs will never be used.[123] This implies that drug prevention programs should focus on reducing exposure to risk factors and modifying factors that are already present. Preventive interventions need to address conditions antecedent to an adolescent's association with drug-using peers; for example, a disrupted family environment and nonconformist attitudes.[18,20] Programs should consider including parenting skills

training and functional family therapy. Enhancing social competence in early elementary grades could reduce risk of later drug use by reducing behavior problems and increasing the level of commitment to school. The psychological triad of alienation, impulsivity, and distress commonly seen in adolescent drug abusers may be effectively addressed through efforts aimed at encouraging sensitive and empathic parenting, at building childhood self-esteem, at fostering sound interpersonal relationships, and promoting investment and commitment to meaningful goals.[21]

Many of the program evaluations and research studies conducted so far have some methodological shortcomings, including: the absence of a control group; pre-intervention differences between the experimental and control groups in drug use by parents, siblings, and peers; poor long-term follow-up; and student attrition. Study evaluations often have not controlled for classroom and school effects; programs targeting one drug may not be generalizable to other drugs; and school-based interventions may miss the highest risk youth. So far studies have predominantly involved white middle-class populations. Future studies need to standardize the definition of drug use, include appropriate control groups, and correct for the confounding effects of variables associated with drug use attitudes, behaviors, and risk factors.[124] Other areas for research include determining the effectiveness of various program providers, the optimal age for intervention, the extent to which school and teacher differences affect program delivery, the potential efficacy of family intervention components, the relative importance of specific program components, the extent to which reduction in substance use during early adolescence persists, and the issues of program acceptability, fidelity of implementation and provider training.[70] Questions have been raised concerning which intervention components of a community-based prevention program are most cost effective.[62,89,120]

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